REMARKS

Rejections Under 35 USC §103

Claims 1-20 and 42-44 have been rejected under 35 USC §103(a) as being unpatentable over Krall (US Patent No. 4,713,235) in view of either Chorbadjiev et al. (article entitled "The effect of fillers upon properties of electroconductive cyanoacrylate adhesives from the International Journal of Adhesion and Adhesives July 1988), and either Loctite 410 or Loctite 416, further taken with the state of the prior art as exemplified by at least one of Liang et al. (US Patent No. 5,233,131), Fogal et al. (US Patent No. 5,140,404), Farnworth (US Patent No. 5,218,229) and German Patent 4107347.

Claims 21, 22, 40 and 41 have been rejected under 35 USC §103(a) as being unpatentable over the admitted prior art in view of JP 58196280.

The rejections under 35 USC §103 are traversed for the reasons to follow. In addition, the independent claims have been amended to include the recitation of the "polymerizing step" being performed "without heating the die and the leadframe". Antecedent basis for this recitation is contained on page 10, lines 13-15 of the specification. The additional recitation is intended to further distinguish the method of the invention from the prior art.

35 USC §103 Rejections of claims 1-20 and 42-44 over Krall in view of Chorbadjiev et al., the admitted prior art and either Loctite 410 or Loctite 416 and at least one of Liang et al., Fogal et al., Farnworth, Davis and German Patent 4107347

The rejections under 35 USC §103 are traversed as the combination of references does not teach or suggest all of the features of the present claims, as required by MPEP

2142, 2143 for establishing prima facie obviousness. More particularly, the combination of references does not teach or suggest a semiconductor packaging method in which a cyanoacrylate adhesive material is used to bond a die to a leadframe, and a polymerizing step is performed without heating the die and the leadframe in less than sixty seconds.

In view of the non disclosed features, and other differences between the claims and the prior art, the subject matter of the claims "taken as a whole" would not have been obvious to one skilled in the art at the time of the invention. Applicant further submits that one skilled in the art at the time of the invention would have no incentive to combine the references, as required by MPEP 2142, 2143.

The primary reference to Krall was cited as teaching a semiconductor packaging method in which a cyanoacrylate adhesive is used to bond a die to a leadframe. This holding is based on column 1, lines 47-53 of Krall, which state: "For instance, in the manufacture of electronic micro-chips it has been suggested that MCA may be a useful adhesive for joining contact leads to the chips. Since a major failure mode of electronic chips occurs at the chip-lead interface, it would be advantageous if such cyanoacrylate adhesives were radiopaque so that the weld could be examined".

In the Amendment dated August 6, 2003, Applicant had argued that this excerpt from Krall suggested using the MCA to bond conductive leads to the die (chip), rather than to bond the die to a leadframe. The Examiner has countered in the Office Action with the secondary references to Liang et al., Fogal et al., Farnworth, Davis and German Patent

4107347, which demonstrate that it is well known in the art to bond dice to leadframes using an adhesive.

Applicant submits that both interpretations of Krall are plausible. However, the relevant passage in Krall is so devoid of information that it does not enable the concept of bonding a die to a leadframe using a cyanoacrylate adhesive, and polymerizing the adhesive without heating the die and the leadframe in less than sixty seconds.

Further, under 35 USC §103 a person with ordinary skill in the art is presumed to known the teachings of all the material in the prior art. However, the cited statement in Krall does not rise to the level of teaching the steps of the present method, even in combination with general semiconductor packaging knowledge, as exemplified by the secondary references. In this regard, there is no disclosure in the cited combination of references of providing a cyanoacrylate adhesive with the stated characteristics, and then polymerizing the adhesive without heating the die or the leadframe in less than sixty seconds.

With respect to the presently claimed polymerizing step, the conventional wisdom in the art at the time of the present invention was to perform a polymerizing step by either heat curing the adhesive, or in some cases by using curing times of minutes rather than seconds. (See for example column 5, lines 39-42 of Farnworth.) In view of this major difference, the presently claimed method exhibits an insight running contrary to the teachings of the prior art, which is indicative of the unobviousness of the present claims.

In the Office Action, In re Bozek, 416 F.2d 1385, 163 USPQ 545, CCPA (1969), was cited for holding "that one skilled in the art would have been expected to have basic knowledge of the art and one skilled in the art would have been expected to use common sense and common knowledge from the art." However, this case also stated: "The test for obviousness is not whether the features of one reference may be bodily incorporated into the other to produce the claimed subject matter but simply what the combination of references makes obvious to one of ordinary skill in the pertinent art". Applicant submits that although cyanoacrylate adhesives are known in the art, the steps of the present semiconductor packaging method, particularly in view of the recited polymerizing step, define unobvious subject matter.

Also in the Office Action, In re Sovish, 769 F.2d 738, 226 USPQ 771 US App. (1985), and In re Bode, 550 F.2d 656, 193 USPQ 12, CCPA (1977), were cited as holding: "The ordinary artisan is presumed to know more than what he reads in the references, he is presumed to have sufficient basic knowledge to apply and combine features of the prior art."

Applicant is unable to locate any discussion in In re Sovish on the skilled artisan using basic knowledge to combine references. However, this case did state: "the sole question before us is whether the PTO erred in deciding the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art". Again Applicant submits that the present claims "taken as a whole" define a semiconductor packaging method

which was unobvious to one skilled in the art at the time of the invention.

With regard to In re Bode, this case did discuss basic knowledge of the skilled artisan, but it was in the context of enablement under 35 USC §112, and evaluation of a reference under 35 USC §102. Specifically, this case stated: "Every patent application and reference relies to some extent upon knowledge of persons skilled in the art to complement that disclosed in order that it be "enabling" within the meaning of 35 USCS §112 and to satisfy the requirements of a reference under 35 USCS §102".

In the present application neither enablement under 35 USC §112, or rejections under 35 USC §102 are at issue. Rather, the issue is whether the cited secondary art in combination with Krall renders the present claims as obvious. Applicant submits that Krall does not teach or enable a semiconductor packaging method as presently claimed, and that the combination of Krall and the cited art does not render the present claims as obvious.

Applicant would further argue that one skilled in the art at the time of the invention would have no incentive to combine the references in the manner of the Office Action for the same reasons stated in the Amendment dated August 6, 2003.

35 USC §103 Rejections of claims 21, 22, 40 and 41 over the admitted prior art in view of JP 58196280

The admitted prior art was cited as teaching anaerobic adhesives cure at room temperature in less than sixty seconds. JP 58196280 was cited as teaching "it was known

to utilize an anaerobic adhesive to join a chip to leads of a board in the manufacture of a semiconductor assembly".

However, the cited combination does not disclose or suggest a semiconductor packaging method in which an anaerobic adhesive is used to bond a die to a leadframe. Rather, in JP 58196280 an electrically conductive paste connects terminal electrodes 4,5 on a chip 1 to conductor patterns 6, 7 on a printed circuit board 2. Further, the cited combination does not disclose or suggest the present "polymerizing" step "without heating the die and the leadframe" in a "method for packaging a semiconductor die".

Still further, one skilled in the art at the time of the invention would have no incentive to combine JP 58196280 and the admitted art. As proposed incentive the Office Action states: "It would have been obvious to employ quick curing adhesive of Japanese Patent '280 in the operation of joining a chip to a leadframe as such use of anaerobic adhesives would have sped up productivity".

However, JP 58196280 teaches using an electrically conductive paste for "fixing a part such as an electronic element chip to a substrate keeping the electrical conductivity to the substrate in a short time at normal temperature without using a temporary bonding process". This short curing time would be similar to the time required to harden a solder alloy in a conventional solder bonding process. Applicant does not agree that one skilled in the art would read JP 58196280 and infer that a die bonding process in a semiconductor packaging method would be sped up with an anaerobic adhesive. Particularly, where conventional heat curing of an adhesive can be accomplished in minutes, and JP 58196280 teaches a similar curing time of "a few to scores of seconds".

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 1-22, and 40-44 is requested. An Information Disclosure Statement is being filed with this Amendment. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

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December 24, 2003
Date of Signature

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